chemical forces actively operate therein. For the continual change of its component parts is a chief characteristic of every living organic substance. These forces may disturb the chemical equilibrium of other substances, and cause the formation of new products. If the constituents of the blood—the combinations of protein, the colouring matter, &c.—enter the liver when it is in a state of action, and are there put in contact with the gall during its secretion, and with the substance of the liver itself, which is in a state of continual alteration, then the result will be, that this change of their component parts having taken place, the action will be transferred to the elements of the blood, and will maintain the secretion. If, on the other hand, the constituents of the blood are in a state of continual change, then the circle of action in which they are involved will extend to the mass of the liver; and so with every organ.

We have, however, no more knowledge of the manner in which this secretion originally commences—whether it proceeds from the blood or from the secreting organ, or whether each of these contributes its part—than with the manner in which the first germ of the whole organ, the liver, is produced, or in which the germ of the animal is converted into an animal. But the continuance of the action—the duration of secretion—entirely corresponds with some other phenomena, which we may observe separately, and which therefore throw light upon these animal actions. This is the case especially with fermentation, from which Liebig has drawn many illustrations, for the purpose of clearly exhibiting his ideas; and with the same view we shall also avail ourselves of the same process.

Yeast changes sugar into carbonic acid and alcohol, and is at the same time changed itself. The latter change causes the former, and is only transferred to the sugar. If we substitute blood for yeast, and the liver for sugar, we may form an idea, more or less, of the secretion of the gall. The component parts of the blood are continually undergoing change. This constant change of the component parts in organic bodies is a chief cause of the continuation of their existence. The liver without intermission assumes new parts and loses others. This process we call nutrition. At the same time that the parts of the blood in the substance of the liver are thus undergoing change, chemical forces are excited; these forces are transferred to the elements of the blood, and so are enabled to produce from them the gall. This takes place the more easily, as the blood itself is also in a state of continual alteration, and thus readily yields to the impulse which, in some way or other, is communicated to it. As the impulse varies, so does the effect. Hence that great diversity in the secretion of very dissimilar substances, which are in a state of alteration, from the same fluid—that is, the blood, which is itself at the same time in a state of decomposition.

From the nutrition of the cellular texture, however, which must be produced from the component parts of blood, and from the nutrition of all the secreting organs—which, besides producing the secretion, maintain themselves by separating what they require from the constituents of blood—we learn that catalysis cannot be left out of consideration in the mere process of nutrition. Further, we must apply the same principle to all the solid parts of the body, which are compounds of protein. The muscles, for instance, have the property of secreting protein from blood, and converting it into fibrin; on the other hand, when protein is deficient in the blood, this fibrin is taken from the muscles and converted into blood-protein, as in diseases of long continuance and in emaciation. Muscles have thus the property of forming muscle-fibrin by simple contact, if protein abounds in the blood, and this result can be ascribed only to a cause similar to that by which crystals gradually accumulate from solutions of salts. It is at least a peculiar action, different from ordinary chemical action, which takes place when the plasma of blood is transformed into muscles, which in composition do not essentially differ from the plasma. The same is the case with the production of hair, nails, and permanent horns.—*The Chemistry of Vegetable and Animal Physiology.*

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12. *The Urine in Bright's Disease of the Kidney.*—By Dr. SCHLOSSBERGER. After it was observed that albuminous urine accompanied Bright's disease of the kidneys, the presence of *albumen* in the urine was long regarded as pathognomonic of that affection, and its diagnosis was thought to be complete, when albumen showed itself in the urine on the application of heat, or on the addition of mineral

acids. This idea is now abandoned, as the later and more elaborate researches of Simon, Becquerel, Lecanu, Golding Bird, &c., have shown that the presence of albumen in the urine of disease is so frequent, that its absence is nearly as remarkable as its presence. That Clinical Chemistry, therefore, may preserve in the eyes of the practical physician its well-deserved importance, it seemed imperative, in the present instance, to seek for some new method of diagnosis. It has sought aid, therefore, in the *microscope*, an instrument without which, in these times, this branch of Chemical Science can make but little progress.

F. Vogel, Scherer, Simon, and others, have recently found in the urine of Bright's disease *tortuous thready bodies*, of which Henle appears to give a satisfactory explanation, when he regards them as inflammatory exudations thrown into the smallest tubuli of the cortical substance of the kidneys. In the case of Bright's disease, which I shall afterwards have occasion to describe, I discovered these microscopical bodies in large quantity, and of various sizes; the majority of them were filled with the so-called globules of inflammation; others contained globules identical with those single particles, the aggregation of which appears to form the globules of inflammation; a few also were without either of these. Whether the appearance in the urine of those formations is sufficient for the diagnosis of Bright's disease appears to me very doubtful, since they will most probably be found in every primary or secondary nephritis, in which coagulable lymph has been secreted in the tubuli uriniferi: and this is the more probable, as Lehman and Scherer have already discovered these bodies in the urine of scarlatina.

The existence of albumen, and of those microscopical bodies in the urine, not being sufficient to characterize Bright's disease, we shall now inquire, if in the *relative proportions of the ingredients of the urine*, there cannot be found some peculiarity which, with the above mentioned tests, may indicate with sufficient certainty the diagnosis of that affection of the kidneys. Scherer (in his *Chemico-Microscopical Researches*, Heidelberg, 1843), gives several analyses of the urine of Bright's disease, in all of which the *total amount of solid matter* (notwithstanding the presence of albumen) is very remarkably diminished. In one case, for instance, he obtained from 1000 parts of urine only 12·4, and in another, 11·7 of solid residue, exclusive of the albumen of which in the two cases he got respectively two and three parts per mil., whilst from the healthy urine, twice, or even three or five times this quantity are obtained.

If this great deficiency of solid matter was shown to be constant even to a certain extent, it would form, along with the albumen and the microscopical formations, an excellent method of diagnosis, principally, as in other cases of albuminaria, in inflammations, and in exanthematous fevers, the quantity of the solid residue of the urine is generally increased, in consequence of the augmented metamorphosis of the blood. To the great majority of the analyses of Becquerel, (*Séméiotique des Urines*, Paris, 1841, p. 505), the urine in Bright's disease was what he calls "*animique*," that is, very poor in solid ingredients: in one acute and feverish case, however, he obtained thirty-five parts per mil. of solid matter. Simon, on the contrary, (*Anthropochimie*, vol. ii, p. 415, and 418,) in a few analyses of it, found 33.6 per mil. of solid residue,—a quantity which, after subtracting the included albumen, approaches very near to the normal proportion.

These results show that the quantity of solid matter in the urine of Bright's disease varies very much, in some cases being very poor, and in others, again, very rich in solid substances. This diversity may be perfectly explained by various accidental causes and individual circumstances, but principally, by the stage of the disease at which the examination was made, by the chronic or acute character of the disease, and often by the general or constitutional causes which gave rise to it.

But there is another question, viz., whether the *relative proportions between the quantities of the different healthy solid constituents of urine* are not abnormal in Bright's disease? Before, however, entering upon the discussion of that question, I shall take the liberty of giving the analysis of such an urine, which not only possesses some interest with regard to the point alluded to, but has also a particular reference to the period of the disease at which it was secreted. The history of this case of Bright's disease was communicated to me by some friends in the Julius' Hospital at Würzburg, but as it is in various points of view very incomplete, I shall only select a few of the principal points to introduce the reader somewhat to our patient; for the analysis of an abnormal secretion, or of a product of disease without the history of the case, appears to me to be in itself without value, to be withdrawn from every source of control, to favour false conclusions, and therefore to be more prejudicial than useful.

The patient was a basket-maker, nineteen years old, of scrofulous diathesis, lax, torpid, and phlegmatic in his constitution. Both of his parents had died of general dropsy, which, in the case of his mother, originated in an organic affection of the liver. The patient himself had never been affected by any important disease until Easter, 1844, when, without any very apparent cause, but most probably after exposure to cold, he was attacked with colic and œdema of the feet; with which a diminution of urine was soon associated, so notable that it surprised the patient himself. About a month afterwards, dropsical swelling of the lower part of the abdomen, slowly but constantly extending to the superior regions, supervened. The urine, which, till the middle of August, had been scanty, became from that period muddy and darker in colour. The medicines administered for the dropsical symptoms had little effect, and the disease appeared to have passed into a chronic state, till suddenly on an evening in September, alarming symptoms of affection of the brain showed themselves, in the form of maniacal paroxysms, followed by intervals of rest but perfect unconsciousness. After this had continued about twelve hours, they ceased, and the patient, though somewhat exhausted, passed again into his former condition. I had now an opportunity of subjecting the urine secreted *immediately before* these attacks to an elaborate analysis in the laboratory of Professor Scherer. My friend, Dr. Renges, of Nassau, again analyzed the urine which the patient had passed a few hours *after* the paroxysm, and permitted me to publish his results.

1. *The urine before the paroxysm.*—This was secreted in the evening. It amounted to about ten ounces, was of a pale yellow colour, faintly acid, and manifestly contained the above-mentioned tortuous bodies, mixed with epithelial fragments. After standing for eight hours, it deposited a considerable sediment of uric acid: its specific gravity was 1011·6. It was evaporated, till, by longer heating in the water-bath, no farther diminution of weight was obtained, and a residue of 58·06 parts per mil. remained. The incineration of that residue gave 9.77 of fixed salts. Coagulated by boiling, (due attention being paid to the necessary precautions with regard to neutralization,) it yielded 17.9 of albumen. The filtered fluid (after separating by means of nitric acid the urea, which amounted to 7·6), gave 19·5 of matter soluble in alcohol. That part of the filtrate which was insoluble in alcohol, amounted to 12·7 per mil. and of this 2·6 consisted of uric acid, with a little mucus; so that, of matter insoluble in alcohol, of phosphates of the alkaline earths, and of sulphates, there remain 10·1 *per mille*.

2. *Urine secreted after the paroxysm.*—The physical properties of this urine were almost the same as the last. The analysis was conducted in the same manner; and the points in which the two analyses differ, and those in which they agree, will be made manifest by the following table:—

	A. *Before paroxysm.*	B. *After paroxysm.*
1. Water,	942·0	931·3
2. Albumen,	17·9	17·0
3. Urea,	7·6	4·5
4. Alcoholic extract with salts,	19·5	20·5
5. Uric acid and mucus,	2·6	5·2
6. Extractive substance and salts insoluble in alcohol,	10·1	20·9

Water,	942	Water,	931
Solid residue,	58	Solid residue,	69
	1000		1000

In both analyses, therefore, there was found a considerable quantity of solid residue, even after the subtraction of the albumen. On the other hand, we have here, as in almost all the cases examined by Becquerel, Simon, and others, a *considerably diminished secretion of urea.* In healthy urine, the urea amounts nearly to one-half of the solid residue: a fact which is especially seen in the analyses of Berzelius and Lehman, both of whom found in 60 parts of residue about 30 of urea. Lecanu, also, as the average quantity of urea in healthy urine, gives from 27 to 30 parts per mille. (*Journal de Pharmacie*, 1839, tom. xxv. p. 68.) His accounts are, however, of less value, as in his numerous analyses of urine he omitted to determine the total amount of solid residue. In the analysis given above I found the amount of urea to be about one-sixth, and Dr. Renges, in the urine after the paroxysm, found it to be one-eleventh of the whole solid residue after subtraction of the albumen. Becquerel likewise, in all the cases of Bright's disease, of which he had examined the urine, had already, with one single exception, found that the urea amounted only to one-third part, or even less, of all the solid constituents.

A *diminution of urea*, therefore, both in its *relative* proportion to *the other solid* constituents of urine, and also in *its absolute amount*, appears pretty constant in the urine of Bright's disease. But it would be rash to draw any definite conclusion merely from these results. It is necessary to gather materials before we build. Whether the source of the diminution of urea in this disease is to be sought for in an original alteration of the blood; in a deranged metamorphosis of matter in the body, qualitatio or quantitatio, or in the degeneration of the secreting organ, and the injury thereby unavoidably given to its secreting power; on all of these points farther research can alone decide.

Though in many cases, at least, the metamorphosis of the blood appears to be unaffected, yet *urea is produced, though secreted in deficient quantity and in abnormal situations;* and the blood becoming overcharged with that singular substance, produces a narcotic action upon the nervous system, just in the same manner as the bile acts in some cases of icterus.

The existence of urea in the blood, supervening on granular degeneration of the kidneys, appears from the researches of Babington, Christison, and Simon, no longer doubtful, although some others have failed in detecting it: for one positive account of an authentic observer has, in questions of this sort, more value than ten negative results. Moreover, in the serum exuded so frequently into the ventricles of the brain in cases of Bright's disease, the presence of urea has been repeatedly demonstrated. I myself, in my capacity of assistant physician in the Catherine Hospital at Stuttgart, observed one such case, where the serum in the ventricles of the brain contained urea beyond all doubt. The *quantity of the other solid constituents* of the urine in Bright's disease, seems much more subject to variation; the quantity of uric acid was, for example, found by some chemists much diminished whilst in our analysis, its quantity greatly surpasses the average of healthy urine. In the analytical methods for the exact quantitative determination of those constituents, there exist many sources of error, often scarcely avoidable, and therefore further researches are necessary to ascertain these.—*Lond. & Edin. Monthly Journ. of Med. Sci.*, Aug. 1845, from *Œsterlen's Jahrbücher für Pract. Heilkunde*, for Feb., 1845.

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13. *Miscellaneous Observations on Blood and Milk.*—This is the title of an interesting paper, read before the Royal Society of Edinburgh, on the 7th of April last, by Dr. JOHN DAVY.

The author first treats of the state of combination of the alkali in the blood. Enderlin, from his recent analysis of the ashes of the blood, has inferred that its alkaline reaction is not owing to the presence of carbonate, but of the tribasic phosphate of soda. The author, even admitting the accuracy of Enderlin's results, questions the propriety of applying them to the condition of the alkali in the liquid blood. Carbonate of soda, he observes, is decomposed when heated with phosphate of lime; added in small quantity to blood, it is not to be detected in its ashes. This may account for its not having been found in its ashes. Were the opinion referred to correct, an acid added to blood or its serum, after the action of the air-pump, ought not, on re-exhaustion, to occasion a farther disengagement of air; but he finds that it does. This with other results, induces him to give the preference to the conclusion, that blood contains the sesquicarbonate of soda.

He next considers the viscid quality of the blood particles, and their tendency to adhere together in groups distinct from their aggregation in piles, and to adhere as